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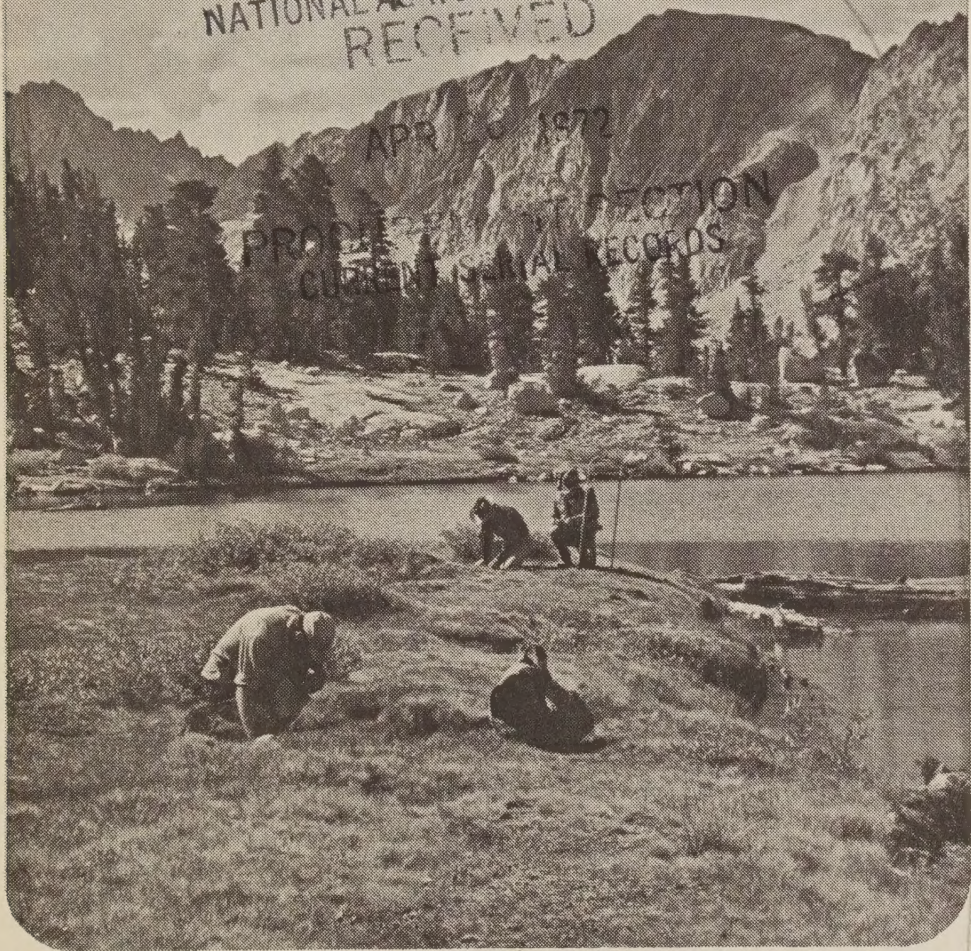
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# Research progress 1971

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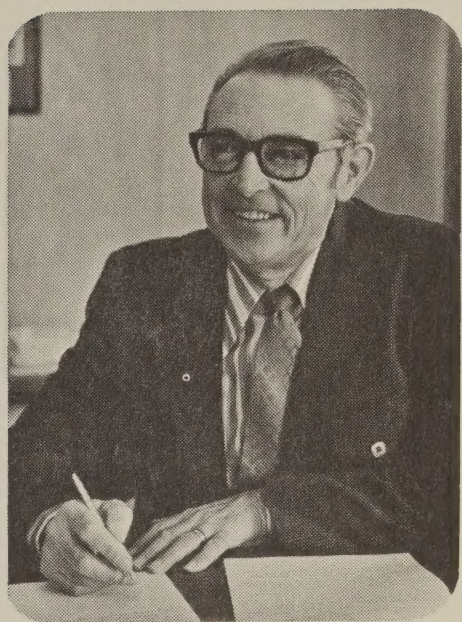


Scientists study high mountain meadows See page 7.

2001  
PACIFIC SOUTHWEST  
Forest and Range  
Experiment Station

Berkeley, California





*It's been a busy year. We've made some important research advances, had a number of key personnel changes, and made some changes in the direction of the research program. In the following pages, I'd like to share some of these events with you. Along with this letter we're also sending the 1971 List of Publications. If you want copies of any of these reports, let us know. I hope you'll also feel free to contact our researchers for additional information. And if you're ever in Berkeley, or at our other research locations stop by. We'll be happy to give you a tour of our facilities, and tell you more about our work.*

A stylized, handwritten signature in dark ink, appearing to read "H. W. Camp".

H. W. Camp  
Acting Director



## Forest Fire Research

In response to the destructive forest fires which occurred in the West in 1970, Congress appropriated an additional \$1 million for research on aerial fire suppression techniques. As part of this effort, the Station made a \$200,000 grant to The Aerospace Corporation of San Bernardino, California, for research on aerial fire attack and retardant systems analysis. The grant is one phase of a cooperative program to accelerate development of better fire control systems through the use of aerospace techniques.

A \$73,920 grant has also been made to Stanford Research Institute of Menlo Park, California, for development of computer models to evaluate the consequences of alternative fire protection strategies.

To help administer these studies, Stanley N. Hirsch, head of Project Fire Scan at the Northern Forest Fire Laboratory in Missoula, Montana, has been detailed to our Fire Laboratory at Riverside to coordinate the Forest Service-aerospace effort. Several of our research units are working on these projects, since they are an extension of some of the work we already had underway.

We have also received an additional \$175,000 for in-house research. This will be used to make improvements in tactical support for firefighting systems. For example, we'll be working to develop a data base design and fire spread model for initial attack simulation, with special emphasis on southern California fuel types. Another study will provide estimates of weather factors required for the simulation.

## FIRE TRACK System Developed

As a result of our own on-going fire research effort, we have developed a new infrared aerial fire reconnaissance system which we're calling FIRE TRACK. Designed by Floyd D. Maxwell, an electronic engineer at Riverside, the system includes a special television camera with an infrared sensor, a portable TV receiver, monitor, and a recorder. The system is portable, simple to build and operate, and can be installed in a plane or helicopter, or used on-the-ground. And it has all the advantages of



conventional television—moving picture, instantaneous display, stop action, instant replay, picture storage, and the ability to record sound along with pictures. Its low cost (about \$1,500-2,000 per unit) should make it very appealing to forest firefighting agencies. The equipment has been tested on experimental fires and on one forest fire. More tests will be conducted, probably when the next large forest fire occurs in southern California.



Infrared TV system monitors forest fires.

## Remote Sensing

During 1971, our Remote Sensing research unit under the direction of Robert Heller, received a USDA Superior Service Award, one of the U.S. Department of Agriculture's highest honors. The project was cited for its "exceptional and original research in developing and adapting airborne sensors for numerous uses by land managers, effecting greatly reduced costs and successfully extending research results at home and abroad." Since the unit was established in Berkeley in 1966, it has produced research results which have established remote sensing as a major aid to forestry and land management.

The remote sensing group was also commended for its cooperative work with the National Aeronautics and Space Administration (NASA) the past six years. The big pay off will come with launching of ERTS, the Earth Resources Technology Satellite, which is scheduled to go into polar orbit 500 nautical miles above the earth sometime this spring.



## Predicting Ski Area Use

Work on a computer program that can help forest managers predict the success of a ski area proposal is essentially complete. The study was begun in the winter of 1967-68 with collection of data at several California ski areas on the place of origin of skiers. The same type of information, gathered from license plates, was collected again in 1969-70, combined with census and transportation data, and analyzed by computer. A two-phase regression method was chosen and built into a computer program which, when given certain information about a potential site (size, location, number of lifts, type of slopes, etc.), can predict the expected use, and which counties will contribute the most. The program has been used by the California Region of the Forest Service to analyze the potential of three proposed ski developments.

The system fills a badly-needed information gap. Among all industries in the business of outdoor recreation, ski resort owners have one of the largest capital investments. Yet few, if any, economic models have been devised to help forecast the use of proposed resorts.

## Wilderness Use Study Completed

In cooperation with the California Region of the Forest Service, we have developed the computer software to analyze data collected under a new wilderness permit system used for the first time in California this year. It required persons visiting Wilderness Areas in California National Forests to register and give information about the number of people in their party, the length of stay, and destination.

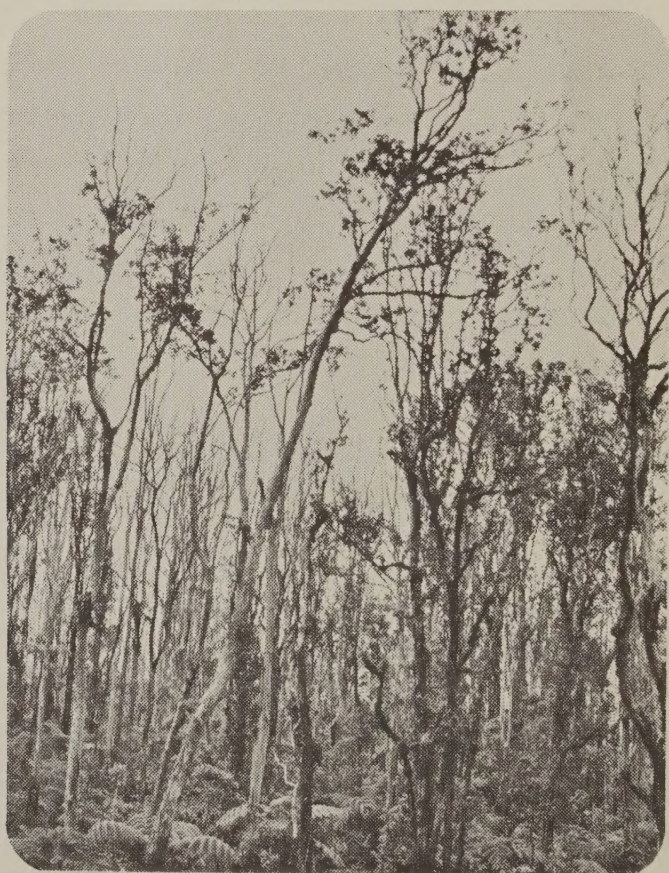
This is the first really massive study of data on wilderness use. It indicates that, regardless of the wilderness area, the most frequent size of party was two persons, and the most frequent length of stay was two days and one night. Data will be used in making decisions about whether to continue the permit system and how to manage wilderness areas for the benefit of both the land and the visitors.



## Research in Hawaii Reviewed

During the past year, we conducted a complete review of the wildland research program in Hawaii in cooperation with the Hawaii Department of Land and Natural Resources. Results are reported in the booklet, "Forest Conservation Research Plan for the Seventies." The report represents a concerted effort to anticipate the need for new information to guide the stewardship of Hawaii's forest environment. The study was a cooperative effort, pooling the knowledge of many persons familiar with local problems and with the sciences basic to conservation in Hawaii and elsewhere in the Pacific Basin. In the future we plan to put even greater emphasis on environmental concerns and on improving the productivity of native Hawaiian forests.

The magnitude of the forest conservation problem in Hawaii was recognized by Congress with a doubling of the research appropriation for 1972. The additional \$250,000 will be used to study the perplexing decline of the native ohia tree and other environmental problems. Of the additional funds, \$100,000 has been earmarked for grants to cooperating research agencies in Hawaii.



In Hawaii, vast areas of native ohia forest is dead or dying.



## WRIS Gets First Test

The Wildland Resources Information System (WRIS), which has been developed by Station researchers during the past two years, is currently being tested on the Stanislaus National Forest. Designed to give accurate in place information on timber and land resources, WRIS promises to be a significant new tool in management planning. In close cooperation with the Timber Management Division of the California Region of the Forest Service and the Stanislaus National Forest, large volumes of data are being assembled from maps, aerial photographs, and ground plots—and “digitized” for computer storage and retrieval. Data going into the computer includes information on timber and vegetation type and class, conditions for logging and reforestation, location and type of recreation areas, and location of Ranger Districts and counties. The success of the Stanislaus test will determine the future of WRIS. As of now it looks good!

## Visual Study of Tahoe Basin Completed

We developed a computer program valled VIEWIT in 1968 which can be used to compute the areas seen (“seen areas”) from a given vantage point, using only elevational data, which is readily available from U.S.G.S. topographic maps. The technique has all kinds of applications—for example, in estimating the visual impact of roads, buildings, powerlines, aerial tramways, bridges, timber harvest areas, and many other types of development. In the beginning, the program could only be used on a rather small land area. For example, the first VIEWIT program could handle data for only about one quadrangle, or 37,000 acres. In 1970, we did a study in the Black Hills National Forest for a proposed tramway and in the process expanded the computer capability to 140,000 acres. This year, a different computer program was prepared, and the system expanded to handle more than one-half million acres. Elevation data for a total of 18 quadrangles surrounding Lake Tahoe has been put into the computer for future use in determining the impact of various types of developments on the scenery.



## Timber RAM in Use

Timber RAM (a Resource Allocation Model) is the first in a series of computer planning tools to be developed by the Multiple-Use Economics Research Unit for preparing long-range timber management plans. With RAM, multiple-use policies and management efficiency are considered in the planning process. Timber RAM was successfully used to update the timber management plans for several National Forests in California this year. More than 150 requests have been received for a Timber RAM Users' Manual recently published. Most of the requests come from Forest Service planners, forestry professors, and professional foresters in private industry. A second printing is underway.

With the success of Timber RAM assured, we've moved ahead to use the same approach in planning other management activities. Work was begun on a Wildland RAM which will provide quantitative estimates of the inputs and outputs for some range and watershed management activities. Another Timber RAM is also being developed for region-wide planning. It will facilitate the coordination of timber management planning on all Forests of a Forest Service Region. When these tools are developed and tested, they will become part of a computerized regional multiple-use planning method.

## Snow Gage Tested in the West

Development of a nuclear profiling snow gage, designed by scientists working at the Central Sierra Snow Laboratory near Donner Pass in California, reached the stage where additional testing under a variety of conditions was desirable. In cooperation with the Atomic Energy Commission, which has helped finance this work, gages were installed at three mountain sites in the West. Data gathered is telemetered to a central computer at the Reactor Test Site of the Atomic Energy Commission in Idaho Falls, Idaho, and will be compared with information from the prototype gage in California.

The snow research group is currently analyzing data collected with the gage from past winters to



learn more about the physical processes involved as snow accumulates, matures, and melts. This understanding is essential in order to develop new techniques for managing snowpacks, and for predicting water yield, and forecasting floods.



### Mountain Meadow Study Completed

The health of fragile mountain meadows in the Sierra Nevada is of concern to recreationists and to Forest Service and National Park Service managers. The high country also provides summer habitat for deer and other migrating wildlife. In recent years, however, mountain meadows have often been found in deteriorating condition...presumably due to trampling by people and excessive pack stock grazing.

For the past five years, we have been cooperating with the National Park Service and the University of California on a study of mountain meadow ecology. Field work, completed this past summer, was done in meadows of Sequoia and Kings Canyon National Parks in the southern Sierra Nevada. Paul Zinke, professor of forestry at the University, plans to prepare a mountain meadow manual summarizing the work. It should be of use, not only to the Park Service and Forest Service, but also to other agencies responsible for managing our wilderness heritage.

In the future, our wildland environmental research unit at Fresno will include high country research as one of their main activities.



## True Fir Cutting Demonstrated

The Swain Mountain Experimental Forest in the Lassen National Forest is becoming a popular place for foresters to visit and see demonstrations of various timber cutting methods in old-growth red and white fir. True fir is an important forest resource in California, making up one fourth of the State's volume and growth of merchantable timber. In addition, these species are important in mountain recreation areas and occur throughout much of the snow zone where management for water yield improvement is also a major consideration.

Although the Experimental Forest was established in 1932, the first cuttings were not made until 1958. Now we have small clearcut patches, narrow clearcut strips, and more recent seed tree and shelterwood cuts. Young trees in the clearcut areas are now about 4-5 feet high and greening up the landscape. Foresters are also impressed with the looks of the seed tree and shelterwood cuts. These methods were chosen after several years of experimental cutting at Swain Mountain, and should result in good natural regeneration of fir, adequate control of dwarf mistletoe, and good watershed management. Similar cuttings are being tried now on several National Forests in California.

We invite you to visit Swain Mountain and see the experimental cuttings for yourself. Special tours can be arranged for foresters and others interested in timber management practices.



Shelterwood cuts are being tested in harvesting old-growth red and white fir.



## Sex Attractant for Bark Beetles Tested

For the second year in a row, we conducted a major field test of the artificial sex attractant of the western pine beetle—to see if it can be used effectively in insect control and survey programs. The study was conducted in cooperation with the California Region of the Forest Service at McCloud Flat in the Shasta-Trinity National Forest.

University of California scientists working on the data predict that the total catch for the season will be about 2.25 million bark beetles in suppression traps, and another 0.25 million in survey traps. Although they won't say yet what that means in terms of having controlled the insect population, we believe the sex attractant is extremely potent and expect it to be a very valuable tool for insect control.

One of our entomologists, C. J. DeMars, received a special commendation this year from the Chief of the Forest Service and the USDA Director of Science and Education for his work on the population dynamics of bark beetles. DeMars has been working on this problem for the past 11 years. Without the type of studies he's doing, we could not judge the effectiveness of the sex attractant—or any other control method.

## Summing Up

In the preceding paragraphs, we've presented a summary of some of the more important research advances during the past year. As always, however, we continue to make progress in many other areas of research, and will announce significant results in future reports.

No statement about 1971 at this Experiment Station would be complete without mentioning two personnel changes which will affect our work in this, and coming years. Robert D. McCulley, who had been Director here since 1967, retired at the end of the year. We hope to announce a replacement for him soon. And early in January 1972, Clyde Walker retired, leaving a big gap in our Information Services Branch. Walker had been editor for the Station the past 25 years and Branch Chief in charge of editorial, library, photographic, and public information services since 1966.



